some beautiful results, including the formation of fixed straight and curved coloured bands, arranged in symmetrical figures, and of pairs of colour-vortices rotating in opposite directions.

Unless these results prove to have been already described, I shall shortly publish an account of my experiments.

SEDLEY TAYLOR

Trinity College, Cambridge, November 12

Expected High Tides

IN your "Notes" last week you say that you cannot understand why the burden of such predictions should fall solely upon Capt. Saxby. This is what many of the public also do not understand. Why does not, say, the Meteorological Office take the matter in hand, and not leave it to some private individual? There can be no doubt the forewarnings are often of the greatest service and have saved the public tens of thousands of pounds and prevented a great deal of misery. What I think Capt. Saxby is to be blamed for is the desire—it may be only apparent—to make a mystery of his predictions with the general public; and what gives weight to this is the fact that the Astronomer-Royal and the heads of the Meteorological Office and Society do not offer the public any aid in what is a purely scientific and eminently practical subject, in which Londoners are more interested than in the transit of Venus, and quite as much as in the storm-warnings for the Channel.

When in March, 1874, Capt. Saxby came forward and in an oracular way predicted a great tide on the 20th, he gave no reasons. This many felt was unsatisfactory. Knowing that it must result from the action of natural laws curiosity led me to investigate the matter, and I found that the subject of extraordinary tides was a matter of much simplicity; that the chief factors reside in the moon with its varying distances and declinations; the next in the sun and the seasons; the next in the winds and atmosphere; and the next, perhaps, in the action of the planets, as Venus and Jupiter, the former of which we know affects the orbit of the earth, and both have probably some power in producing the atmospheric disturbances in the sun.

With these factors I predicted a year in advance the extraordinary tide of November, 1875, which had escaped Capt. Saxby's notice. I was also able to say that there are two unusually high tides revolving through the year, exactly six-and-a-half synodic months apart, each forty-eight days after the same tide of the previous year; that these with the preceding and succeeding tides are chiefly those which may with bad weather develop into extraordinary ones; and that the next great one—a very giant among tides—will be on March 20, 1878.

If Capt. Saxby has some knowledge on the subject which others have not, how is it he did not predict the unusually high tide of October 26 last, which happened when the moon was neither full nor new, nor in perigee? Why it happened is somewhat of a mystery; the only explanation I can suggest is, that the moon had her highest northern declination on that day, and that a barometric depression passed over the North Sea the previous day, both which would tend to heighten the tide.

November 12 B. G. JENKINS

The Towering of Wounded Birds

LAST season I fired at a song thrush at a distance of fifty yards, but the bird continued its course, as if uninjured, for upwards of 200 yards, when it suddenly "towered" in the air, and as suddenly fell to the ground. Upon examination the bird was found to have been shot through the lungs alone, and had bled internally, the throat being full of clotted blood. The head was totally free from any injury. I have known similar instances occur in the pigeon, swallow, and starling. In all these cases the head remained uninjured, and death occurred through internal hæmorrhage. In the case of the starling one pellet entered the spine; the bird continued its course for a few yards, towered, and suddenly fell to the ground dead.

Should you consider these instances bearing on the matter of sufficient importance for an insertion in NATURE they may prove acceptable to those who are interested in the subject.

Heeley, near Sheffield CHARLES DIXON

Cruelty to Animals' Act and Physiological Teaching

I AM desirous of knowing through your many readers if, amongst physiologists, the belief is anything like general, that showing under the microscope the circulation of the blood in a web of a frog's foot is a contravention of "The Cruelty to Animals' Act, 1876."

Dr. M. Foster, in his "Primer of Physiology" (Macmillan and Co., 1877), advises the reader to "go and look at it at once; you will never know any physiology till you do;" and some naturalists here say if no incision is made, the animal being merely tied down, the exhibition of the phenomenon is quite legitimate, while, on the other hand, Prof. Huxley, in his paper before the Domestic Economy Congress (reported in NATURE, vol. xvi. p. 234) states it as his opinion that a teacher is "open to the penalty of fine and imprisonment if he *uses*" a frog "for the purpose of exhibiting one of the most beautiful and instructive of physiological spectacles."

It was this, the expressed opinion of so distinguished an authority as Prof. Huxley, which caused me first to doubt the teacher's right to exhibit the experiment, and it is because of the differences of opinion I have mentioned that I seek to know through your columns, if a teacher is or is not at liberty to illustrate the blood circulation by this harmless experiment.

FRANK W. YOUNG

High School, Dundee, November 12

Smell and Hearing in Moths

NUMBERS of moths, of many different species, are attracted into my room on summer evenings by the light; and they are fond of resting on the lamp shade. One night I was using some very strong ammonia solution—and by way of driving them off I held a 3-ounce bottle of it with the open mouth almost close to them. To my surprise they seemed quite unconscious of it *as a smell*; they would bear it unmoved for a minute, or sometimes for two or three minutes, and they then merely walked an inch or two further away from it. I have since tried the experiment repeatedly, and with several different species; but none of them seem to detect the presence of ammonia except as a man might detect the presence of carbonic acid or of nitrogen in excess, that is, by their effects on his system generally.

The common black and white "magpie moth," it is well known, often feigns death when captured. I caught two, one after the other; both pretended to be dead, and I laid them gently on the table a few inches apart. They had remained motionless for ten minutes, when I took up a wine glass by the stem, and gave it one sharp stroke with a pencil, about six inches away from them. Both moths flew off at the instant the sound was heard. I repeated this many times with the same result—both with these and with other individuals of the same species; and I also found that merely holding the glass near them and waving the pencil about noiselessly, did not arouse them.

Loughton J. C.

Bees Killed by Tritoma

IN a friend's garden here where there are quantities of Tritomas or "red-hot-pokers," hundreds of bees have been this year destroyed by them. The honey produced by the flower is very abundant, and the bees enter the tube of the corolla to get at it; but the tube, which is only just large enough at the mouth, tapers gradually, and so the bee gets wedged in and cannot extricate itself. I saw numbers so caught, some in the fresh flower, while others remained in the completely withered and decaying blossoms. Perhaps it may be due to the fine warm days we have had this autumn, inducing the bees to work too late after our native honey-producing flowers have been destroyed by the wet and frosts; or is it a regular thing which happens every year? If so bee-keepers should discourage the Tritoma, or set to work to select varieties with flowers large enough not to kill their bees.

ALFRED R. WALLACE

Dorking, November 3

Lecture Experiment

THE experiment described below illustrates in a very striking manner the particular instance of the "conservation of energy" exhibited by the equilibrium of liquids of unequal densities, in communicating vessels.

The apparatus consists of a two-necked bottle, having in one neck a very strong glass tube half a metre, or more, in length, and terminating above in a funnel of 200 c.c. capacity, while its lower end nearly reaches the bottom of the bottle; in the other neck is a piece of glass tube, drawn to a jet, and passing only a short distance into the bottle. As the pressure inside the appa-

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ratus is considerable, the corks by which these tubes are fixed must fit very tightly.

In using the arrangement the bottle is filled with water, the jet is then closed with the finger, and the funnel, which should be supported on the ring of a retort stand, is filled with mercury; on removing the finger from the jet the mercury falls into the bottle, expelling the water which rises in a fountain to a height depending upon that of the column of mercury, but rather less than is theoretically possible, the height of the fountain being ten or eleven times that of the fall of mercury. By employing mercury as the falling liquid in Hero's fountain a similar increase of effect may be obtained with that apparatus.

W. A. Shenstone

Fownes' "Manual of Chemistry"

In my review of Fownes' "Manual of Chemistry" are two mistakes which I beg to correct. On page 25, line 1, read *improbable* instead of improvable; and line 6, *dimorphides* instead of isomorphides.

The Reviewer

OUR ASTRONOMICAL COLUMN

The Transit of Mercury, May 6, 1878.—The transit of Mercury, which will occur on May 6 in the ensuing year, is the last during the present century in which the planet can be observed upon the sun's disc for any length of time in this country, and on that occasion the nearest approach of centres will take place only half an hour before sunset; owing, however, to the long duration of the transit, 7h. 35m. geocentric, Mercury will have been upon the disc more than four hours and a quarter when the sun sets. Reducing to Greenwich by the *Nautical Almanac* data it appears the first external contact will occur at 3h. 10m. 58s. mean time, and the first internal contact at 3h. 14m. 4s., or the planet will be 3m. 6s. in wholly entering upon the disc. The least distance of centres will occur at 7h. 0m., and sun-set at 7h. 29m. The duration of the transit is longer than in any other of this century, or indeed than in any one that has occurred since the year 1756.

Up to the present year twenty-four transits of Mercury have been more or less observed; in this number are included that of 1631, November 7, predicted by Kepler, when the planet was seen upon the sun's disc for the first time by Gassendi, at Paris, who observed on the dark-chamber method—by allowing the sun's light to pass into the room through a small aperture in the window, and throwing his image upon a white screen; that of 1651, November 3, imperfectly seen by Shakerley at Surat, and that of 1707, May 6, which was observed through clouds by Roemer at Copenhagen near the egress. Of these *twenty-four* transits it is singular that only *eight* have taken place at the descending node or in May, as will be the case next year. Two-thirds of the number have therefore occurred in November, when we might have expected the hindrances to observation to have operated unfavourably in these latitudes.

Of the three transits of the present century subsequent to 1878, that of 1881, November 7, will be wholly invisible in this country, the ingress taking place at 10h. 16m. and the egress at 15h. 37m.; in the transit of 1891, May 10, the egress occurs soon after sun-rise; and in that of 1894, November 10, it occurs near sun-set. The reader who is curious respecting the transits of Mercury in the next century may consult a communication from the Rev. S. J. Johnson to the Royal Astronomical Society in the *Monthly Notices*, vol. xxxvii. p. 425; and for an account of Gassendi's long watch for the transit of 1631, and his successful observation of it, he may be referred to Prof. Grant's classical work, the "History of Physical Astronomy."

Nova Cygni, 1876.—Prof. Julius Schmidt mentions that the star which he first remarked on November 24, 1876 (and which is not found in the *Durchmusterung*) diminished very regularly from January to August of the present year; it exhibited none of the slight oscillations in brightness which are still seen in T Coronæ, and we may add in other "Novæ." With the Athens refractor he has observed three small stars near the variable, with the following differences of right ascension and declination:—

		s.		″
13m	...	y = Nova − 1·0	...	Nova − 45
13	...	z = ,, − 1·6	...	,, − 81
12·5	...	x = ,, + 4·6	...	,, + 20

It will be remembered that this star suddenly shone out of 3·4 magnitude, and had diminished to the limit of naked-eye vision soon after the middle of December. Its mean place for 1880·0 is in R.A. 21h. 36m. 59·9s., N.P.D. 47° 42′ 16″.

Comet 1873, IV.—M. Raoul Gautier has worked out definitive elements of the comet discovered by M. Borrelly on August 20, 1873, and finds the observations best represented by an ellipse with a period of 3,277½ years, the probable errors of perihelion distance and eccentricity limiting the period between 3,012 and 3,585 years. This comet, however, was observed for one month only, or through an orbital arc of only 58°, and such results of calculation in the present case are not perhaps to be allowed any great weight. There are many other comets which we imagine would better have repaid the labour expended by M. Gautier upon Comet 1873, IV. Expressing his best *parabolic* elements in the manner adopted in catalogues of comet-orbits, we have the following figures:—

Perihelion Passage, 1873, September 10·83679 M.T. at Berlin.

Longitude of perihelion	36° 48′ 40″	M.Eq. 1873·0
,, ascending node ...	230 38 4	
,, inclination	84 0 50	
Log. perihelion distance	9·899956	

Motion—retrograde.

Minor Planets.—A remark in this column some time since upon the probability of several discoveries of so-called new planets proving to be observations of bodies previously detected, appears to be justified by recent experience. Thus the object announced as a new planet by Prof. Watson and M. Borrelly in August last was shown by Herr Knorre, of Berlin, to be identical with No. 141, detected by M. Paul Henry at Paris, on January 13, 1875, and it is now stated that the small planet remarked by Herr Palisa at Pola on October 2 is really No. 161, which was discovered by Prof. Watson on April 18, 1876, and received the name *Athor*. As was to be expected from the rapidity with which discoveries of small planets have succeeded one another of late years, calculation is now considerably behind observation, and we are still without published elements of a number of the bodies lately brought to light.—Prof. Peters states that he has proposed the name *Idunna* for the planet discovered by him on October 14, which is No. 175, a name which he says will be understood by those members of the "Astronomische Gesellschaft" who, at their late meeting at Stockholm, participated in the hospitality of "Ydun."—There is now a strange confusion of mythologies and systems of nomenclature in the minor-planet group, a state of things that at one time might have been readily avoided.

THE ROYAL DUBLIN SOCIETY

A SCHEME for the reorganisation of this society as a branch of the National Museum of Science and Art established by the Government has been under consideration for some time, and a report of the council on the subject was submitted to the society at its meeting on November 8. The scheme includes a recommenda-

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